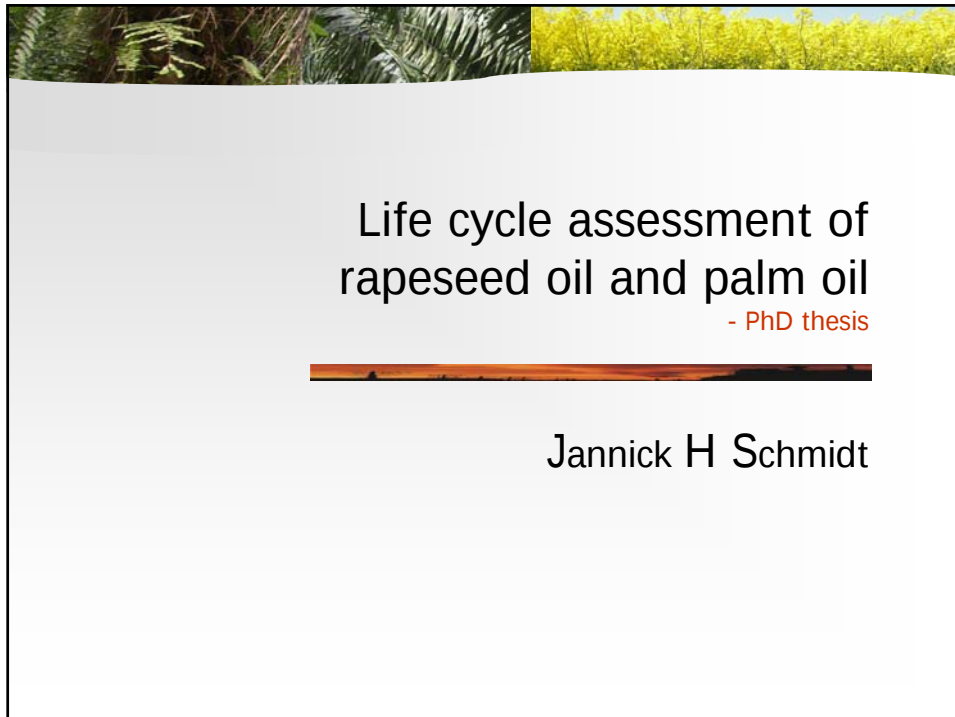




Background

3 observations:

- **Problem: globalisation leads to**
 - Increased outsourcing
 - Environment: Less information, control and regulation
- **Lack of studies**
 - Few comparative studies (local/global) are identified
- **Global/local campaigns are typically based on non-holistic assessments**
 - Need for life cycle perspective: All life cycle stages, global product system
 - Need for inclusion of several impact categories

The focus of the thesis:

Case: Comparative study

Method: Life cycle assessment + development of methods

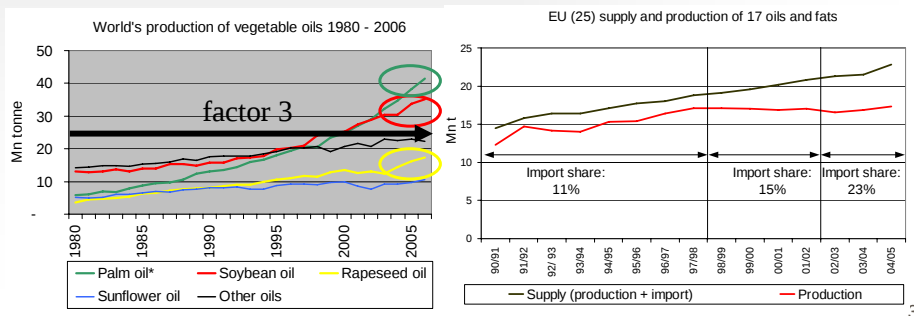
Implementation: Analysis of capacity for improvements

VISIT...

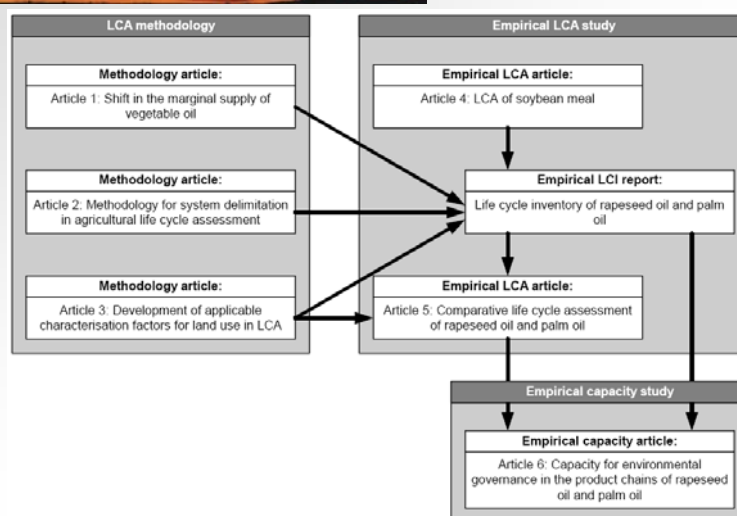
LANZAROTE
Caliente.COM

Casestudy – comparative study - Rapeseed oil and palm oil

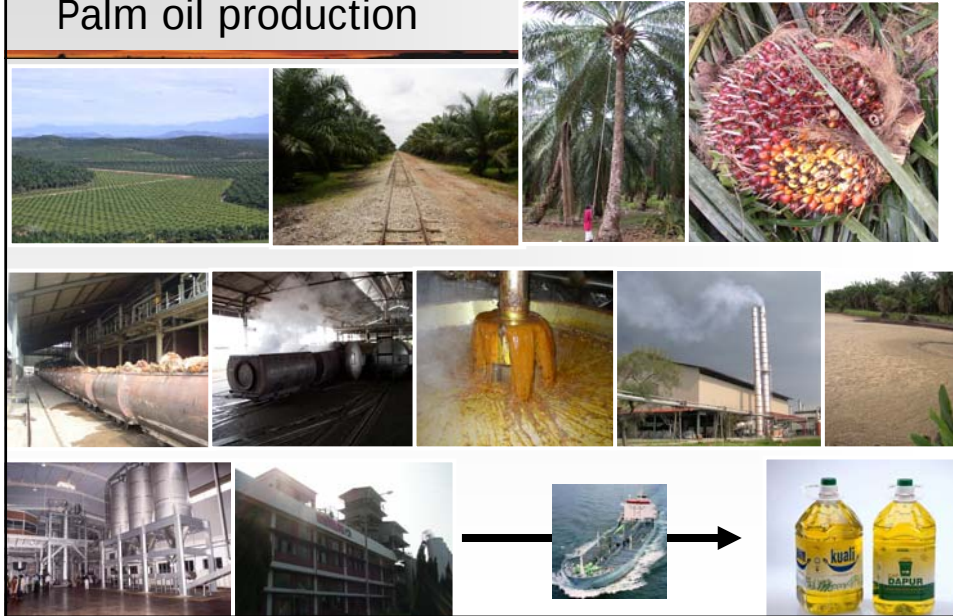
- Most significant impacts: Food, transport and housing
- Important food components: carbon hydrate, fat and protein
- Important fat sources: Palm oil, soybean oil, rapeseed oil
- 2 alternatives: Global and local supply of vegetable oil to the EU



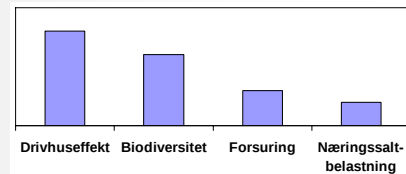
Purpose of the thesis



Palm oil production

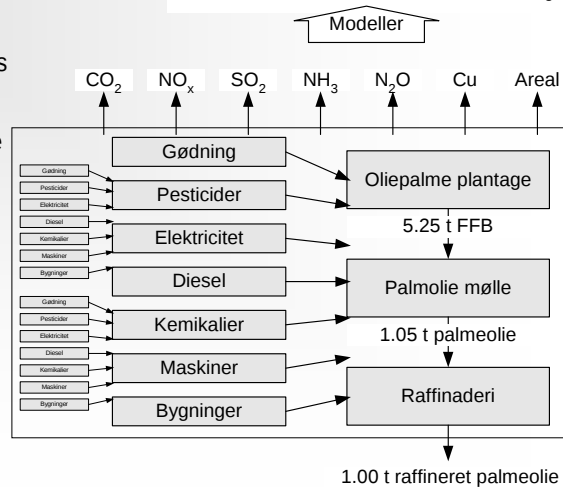


Life cycle assessment



What is an LCA?

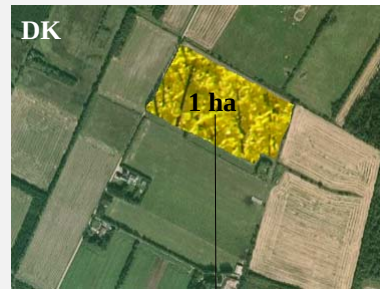
- Env. assessment of products
- Life cycle perspective
- Includes all emissions in the product's life cycle
- Evaluation of emissions: Potential impacts



System delimitation

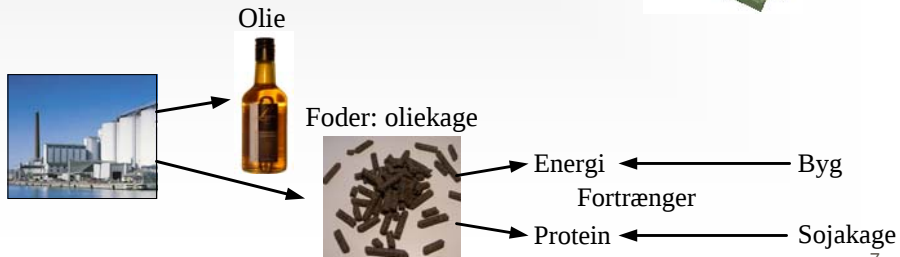
▪ Agricultural stage: Land use – how?

1 ha rapeseed in DK
 ÷ 1 ha barley in DK
 + 1.8 ha barley in Canada

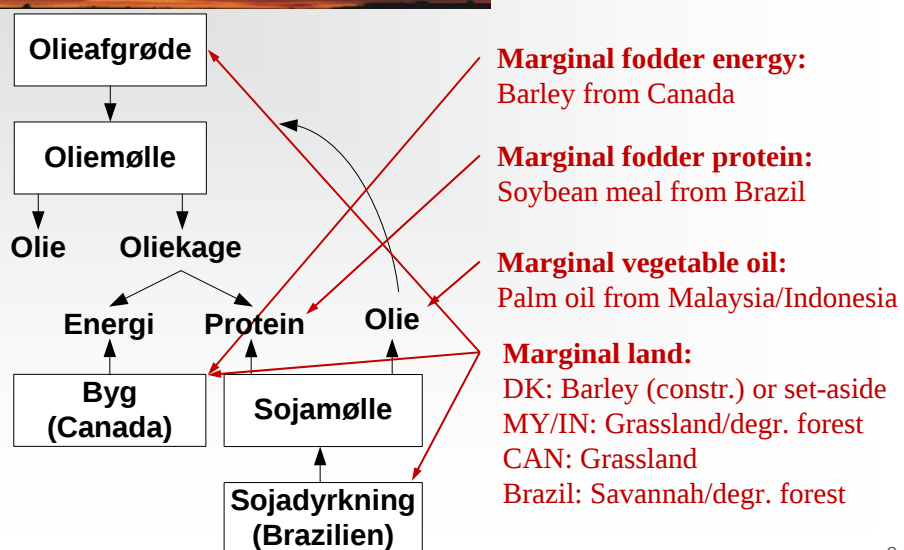


5230 kg barley ?

▪ Oil mill stage: Co-products – how?

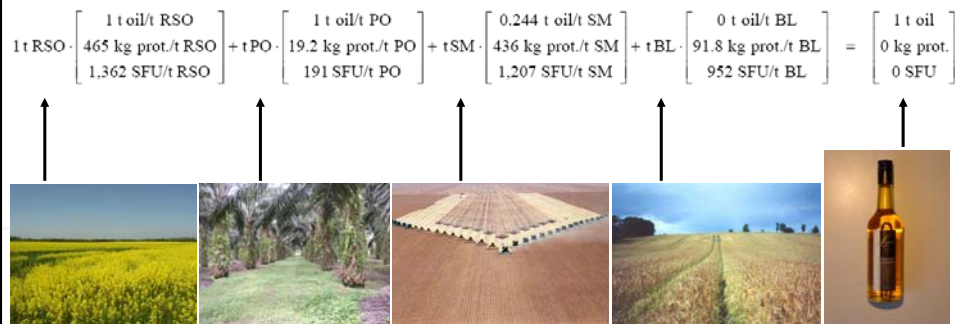


System delimitation - loop and marginal processes



System expansion – loop

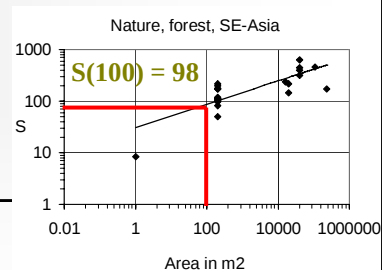
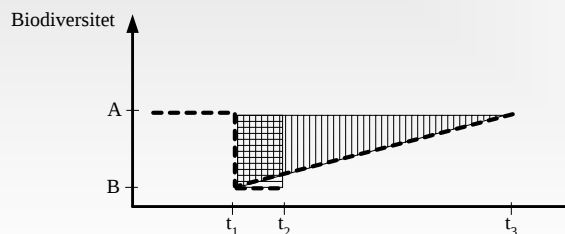
1 tons rapsolie



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Biodiversity in LCA – how?

- Transformation of land: Non-supported species during renaturalisation
 - 1 ha can produce XX? annual yields
- Occupation of land: Non-supported species during occupation
 - 1 ha y occupation is proportional with crop output (annual yield, t per ha)

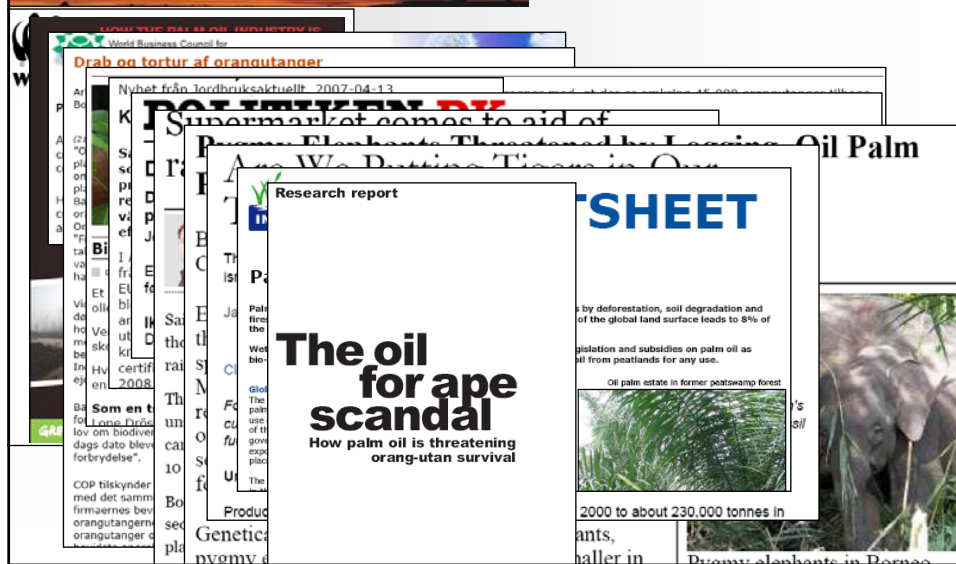


- Determination of A og B (S100)
- Ecosystem vulnerability (wS100)
 - depends of how much nature is left...

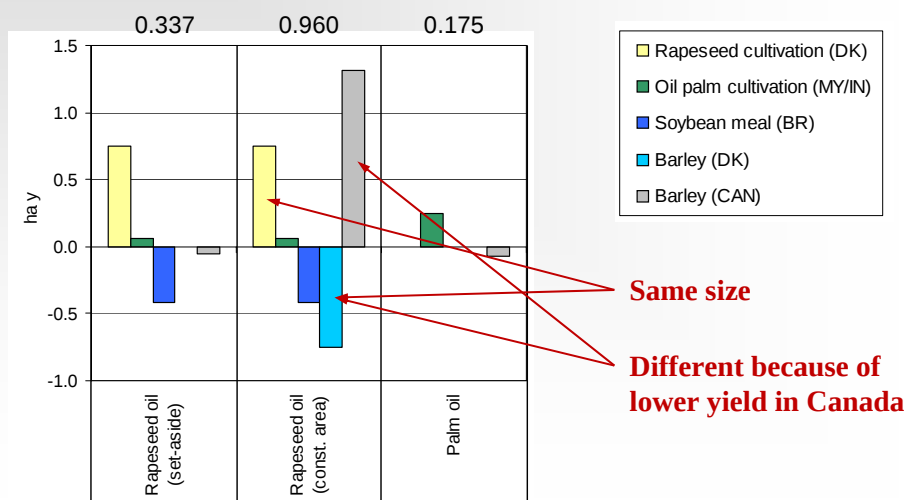
$$S = c \cdot A^z$$

10

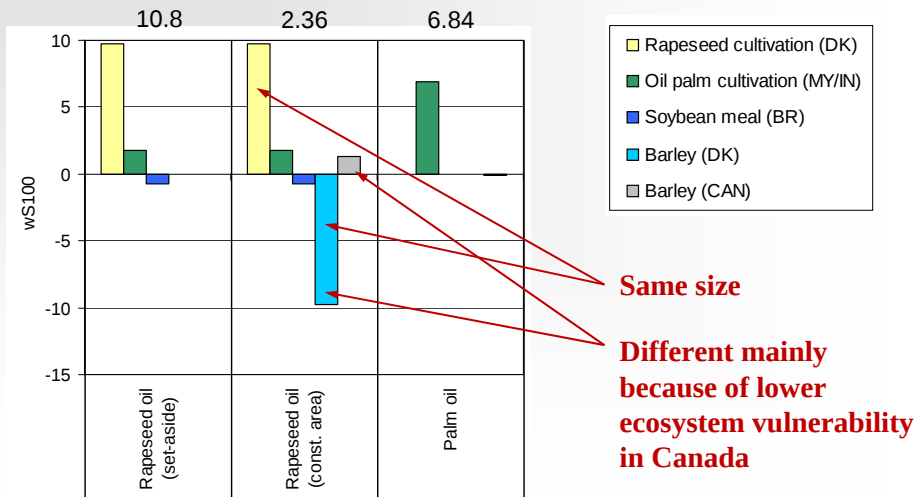
Results – are we biased?



Results – land use (ha*y)

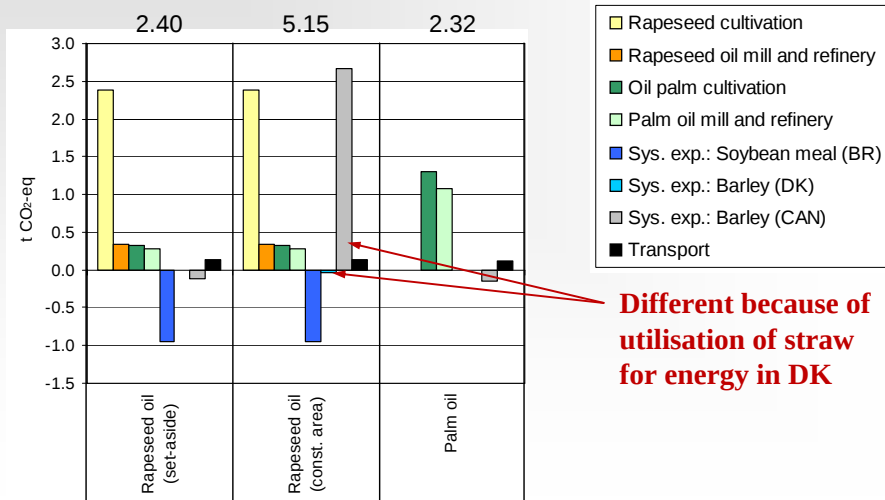


Results – biodiversity (wS100)



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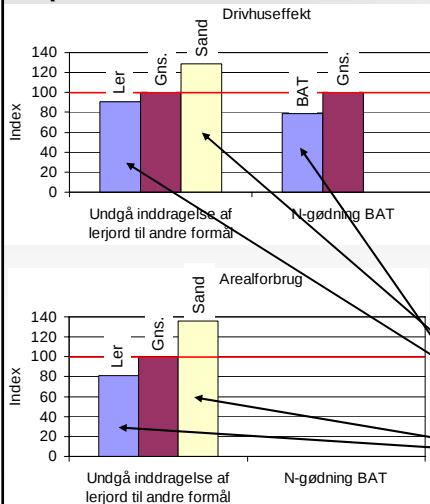
Results – global warming (t CO₂-eq)



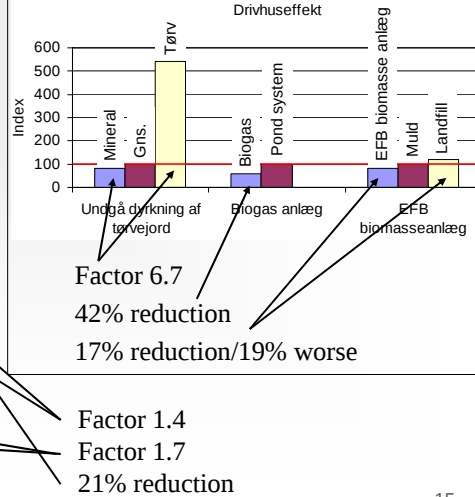
14

Improvement potentials

Rapeseed oil



Palm oil



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Conclusions - method

Consequential LCA

- Closer to reality than before
- Important issues:
 - Marginal crops (where and which nature is affected)
 - Marginal change in cultivation (area or yield)

Biodiversity

- Input to development of methods
- Enables inclusion of all regions and all practises

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Conclusions - results

- Rapeseed oil versus palm oil
 - Rapeseed oil: 1) Area/yield, 2) Set-aside/displacement of barley
 - Palm oil: 1) Mineral/peat soil
- Improvement potentials
 - Rapeseed oil: Limited potential
 - Palm oil: Huge potential, ... and huge risk for a worse situation
- Capacity for improvements
 - Rapeseed oil in the EU: Kyoto – improvements in fertiliser industry
 - Palm oil in Malaysia: 1) RSPO, EU consumers, NGOs and retail, and 2) Kyoto